6

Search and Location Techniques

Objectives

Upon completing this lesson, you will be able to:

1. Define search and location and describe its importance in the success of a CSSR operation.
2. Describe the composition of a search team and the basic equipment used.
3. List and describe the steps for searching and locating.
4. Define void space and identify probable locations in the four basic collapse patterns.
5. Describe the modes, types and patterns of conducting a search.
6. Demonstrate in two practical exercises the steps for a physical search and location, using two different patterns.

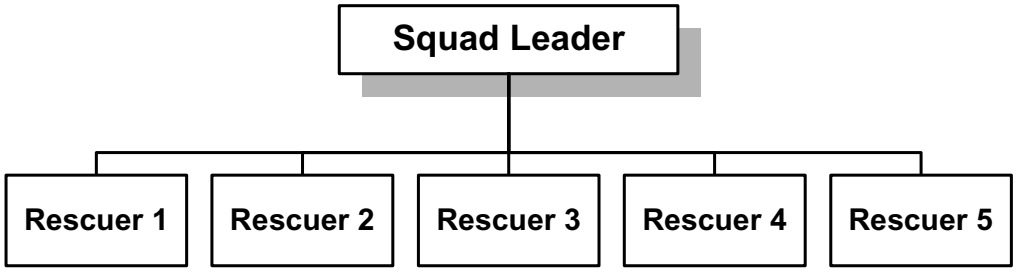
Approximate Duration:

– Lecture: 3 hours
– Practical exercise: 2 hours

1. Searching and Locating

A set of techniques and procedures whose purpose is to obtain a response or indication of the presence of _____ _____ in a void space within the collapsed structure.

2. Composition of a Search Squad



- **Squad Leader:** Responsible for developing the _____ _____, drawing _____, keeping _____ and making recommendations to the _____ _____ .

- **Squad Leader:** Performs the duties of the Safety Officer and is responsible for monitoring _____ during the _____ _____.

- **Searchers:**

  _____

  _____ as outlined by the team leader.

Basic Equipment Required for Physical Searches

- Complete set of personal protective equipment and emergency medical kit.
- Minimum personal supplies required to function unassisted for at least 12 hours:

  – _____ – _____

  – _____ – _____

- Radio equipment to communicate with team members and Command Post

  – _____

- Building and work site marking supplies

  — _____ — _____

  — _____ — _____

  — _____

- Warning and alert devices

  — _____ — _____

  — _____ — _____

  — _____

- Reconnaissance and vision

  — _____

  — _____

  — _____

- Search diagrams, pencils, colour pens, clipboards
- Technical search equipment, specialised or improvised
- Additional materials
  - — North American Hazardous Materials Response Guide
  - — Hazardous Gas Detector

3. Steps for Search and Location

1. Compile and analyse available information.

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2. Secure the scene.

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3. Inspect and evaluate the structure.

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4. Rescue victims with _____ access on or near the _____ , if this has not already been done.

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5. Make INSARAG markings on the structure as needed, if not already done.

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6. Create a _____ of the structure.

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7. Select the area to be searched.

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8. Select a search method.

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9. Conduct an appropriate search pattern and place INSARAG markings where potential victims are detected, both on the structure and on the diagram.

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10. Continually analyse the results and re-evaluate the search plan (make necessary adjustments).

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11. Initiate pre-hospital treatment of the victim.

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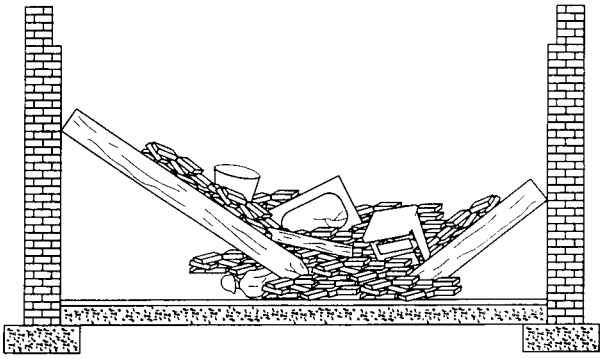
12. Confirm the _____ and _____ of _____ _____ with the resources and equipment available.

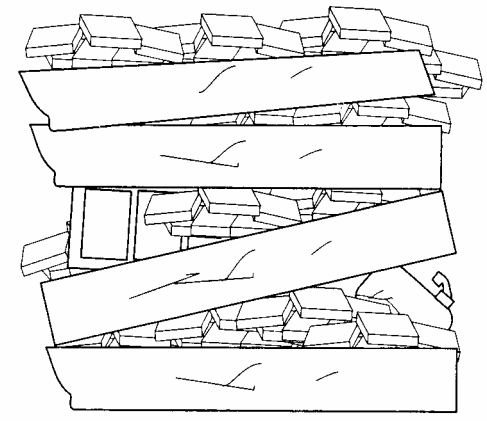
4. Void Spaces

A physical space in a collapsed structure where a person trapped within could remain alive for a short period.

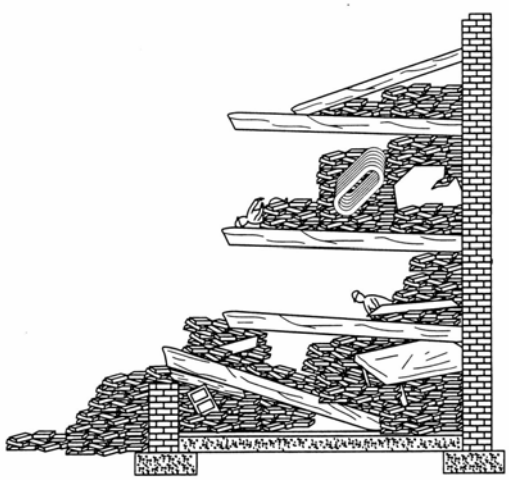
Possible location of void spaces in typical collapse patterns



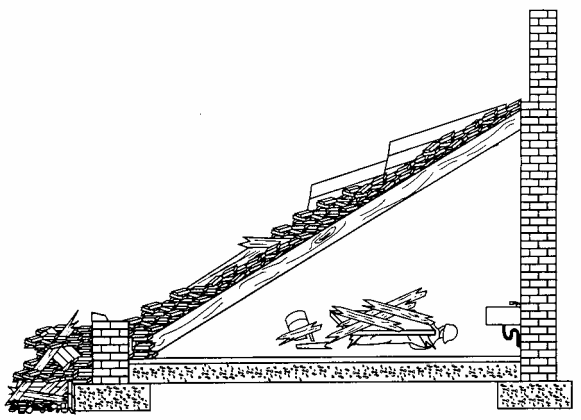
V-shape collapse



Pancake Collapse



Cantilever collapse



Lean-to Collapse

Search Area/Site Sketch

Team # _____ Date: _____ Time:_____ Location/GPS _____ Page: ____ of _____

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4									
5									
6									
7									
8									
9									

Legend / Required Symbols

- North arrow
- Scale
- Sides 1, 2, 3 and 4
- Access points: 1st → 2st →

Chemical

Structural

Environmental

Detected victim

Live victim L - 3

Dead victim D - 3

Resources Utilized

Physical/ Hailing ☐ Acoustic ☐

Optical ☐

Canine ☐ Other ☐

Cut services: E Electricity, G Gas, W Water

Command Post

Staging Area S

Emergency vehicles

Trucks

Heavy equipment

5. Search Modalities

5.1 Hasty Search (Primary)

This type of search is conducted to _____ detect the presence of survivors on the _____ or easily accessible void spaces. Hasty search accomplishes the following:

- Rapid detection of victims
- Scene assessment (information gathered as a result aids in size-up of the rescue problem)
- Sets priorities

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5.2 Extensive (Grid) Search (Secondary)

This type of search is conducted in a _____ manner to pinpoint the exact location of victims. It is designed to cover the entire assigned search area _____ and in _____ . An extensive or grid search accomplishes the following:

- A thorough, systematic search
- Redundant checks
- Allows for use of alternate search resources

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This process may need to be repeated as new information is received and/or as the condition of the structure changes.

6. Search Methods

6.1 Physical Search

Physical search operations do not require _____ or unique, expensive _____. They only require the _____ and some established procedures.

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This search tactic is the first, and sometimes the only, search method used by local emergency service agencies that do not possess technical or canine search resources.

Local first responders must rely on fundamental search techniques. A readily accessible and willing group of volunteers can be quickly trained and supervised to safely conduct physical search operations after a disaster. Basic physical search is usually performed immediately after an incident, and may be done by locals.

Physical search includes the three basic tactics:

- Physical/void search
- Hailing
- Basic search patterns

Reminder: these are general tactics. A search team may need to modify and adapt them and the search mode to fit their specific needs.

6.2 Canine Search

Uses the acute sense of _____ of dogs specially trained to detect _____ _____ .

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Certified canine teams with highly specialized dogs provide the best way to locate trapped victims in a large area in the shortest amount of time. They are able to access areas too small or too unstable for humans to enter. Canines can be used for hasty and extensive operations.

A thorough site search with two well-qualified search dogs has a high probability of conclusive results. The disaster trained search canine is trained to detect those victims that are still alive. Unless trained to do so, rescuers should not attempt to handle the dogs, but coordinate the activities of those who are trained as handlers.

6.3 Technical Search

Requires _____ trained personnel and _____ _____ for sound and temperature detection, video, vibration, etc. Can be carried out using specially manufactured or _____ _____ equipment.

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The latest state-of-the-art electronic search equipment has added a new dimension to the search function by extending its range. Whenever possible, dogs and electronic devices should be utilised together. Technical search equipment can be classified into two groups:

- Visual search instruments
- Electronic listening devices

Visual Search Instruments

These instruments can view the exact location and condition of victims buried beneath several feet of debris. The most useful devices are of small diameter, have articulating probes, and incorporate a light source. A large area can quickly be covered with these tools and they are excellent for void searches. Visual search instruments are divided into two main types:

- **Video devices** that transmit images to a monitor
- **Optical instruments** that project the viewed image through fibre-optic bundles or mirrors to a monocular eyepiece

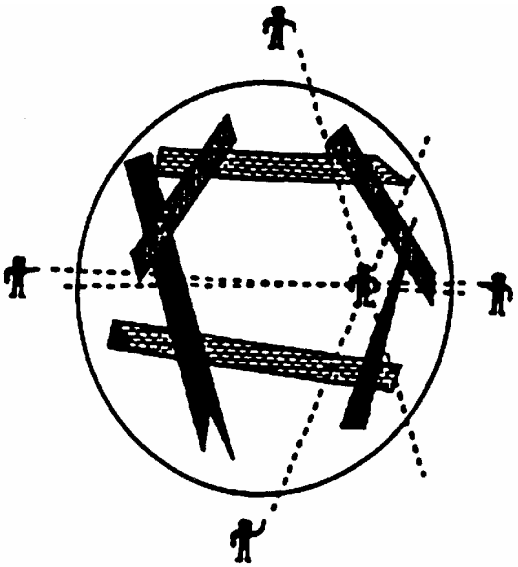
During a hasty search, an operator can quickly assess a site by using by using existing cracks and openings to search for victims. During extensive/grid search operations success has been shown with rescue personnel drilling a series of holes and an operator following along with visual search equipment to assess the newly accessible void spaces.

Electronic Listening Devices

These devices can detect both acoustic sound (such as voice) and inaudible seismic sound (vibrations) produced by survivors deep within a collapsed structure. Although these instruments are capable of filtering a wide range of sound frequencies, they are best used in a noise-free environment. These devices can be used for both hast search and extensive/grid modalities.

7. Hailing Method Procedure

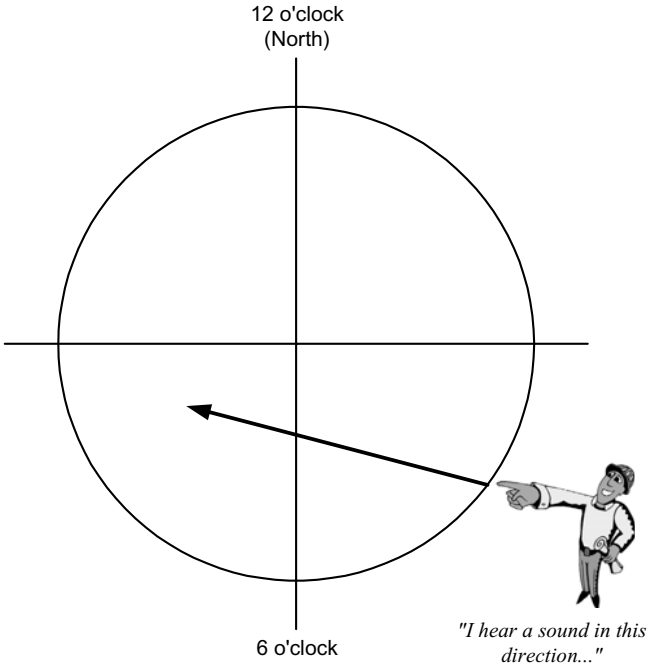
1. The search team leader signals for silence and all work to stop around the area. Four members of the CSSR team take positions in a _____ pattern, positioned at intervals of approximately 8-16 metres in safe locations as close as possible around the search area.



2. Going 'around the clock,' each searcher calls out loudly or with a megaphone, *"If you can hear me call out for help or knock five times on something."* Instead of hailing, searchers may also knock something solid (usually metallic) that is a contiguous part of the site debris in order to elicit a response.

3. All searchers then listen and point in the direction of any potential response to the instructions. If more than one searcher hears the sound, the direction in which they point will triangulate on the source of the sound of the victim. This must be noted on the site sketch or on personal notes, where each rescuer makes a rough sketch of the area and the direction of the source of sound. Use a coordinate grid system and/or the clock system (using North as 12 o'clock).

> The collapse pattern, building materials and a multitude of other variables can cause voices to be heard clearer than knocking, and other times vice versa. Use both methods for greater efficiency.



A variation of the hailing system is to set up several searchers in a straight line across the site, or in grid patterns, as when performing the physical/void search. In this scenario, rescuers are also aligned next to, but off, the rubble pile to detect sound the others on the pile may not hear. The rescuers will hail in the order given, listen and then advance as safety permits. This ensures the entire structure is covered in an extensive grid-pattern search.

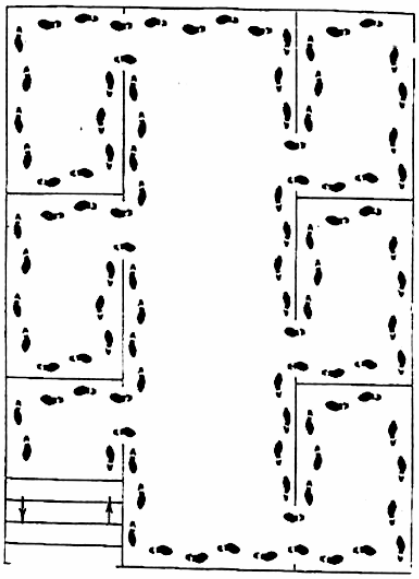
8. Physical Search Patterns

Occasionally you will encounter structures that have not totally collapsed and contain large, open areas or a building with many intact rooms, in which live victims, unable to remove themselves or communicate, will be found. An organized approach will yield the best opportunity to locate a victim, and to declare the area searched.

8.1 Multiple Rooms

The basic instruction for searching multiple rooms is "**go right, stay right**."

1. After entering the structure, turn to the right, stay in contact with the right wall, either visually or physically, until the entire accessible area has been searched and the team returns to the starting point.

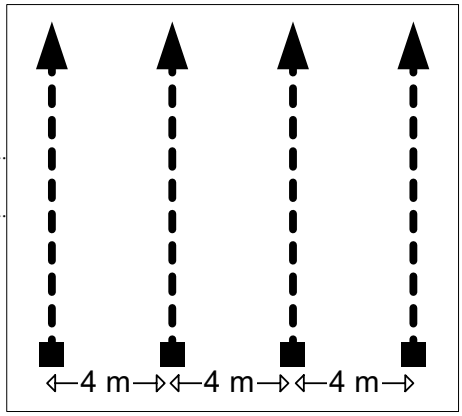


2. If the search team needs to exit and cannot remember the direction they entered, simply turn around and stay in contact with the same wall, either physically or visually, keeping it on your left.

8.2 Large Open Areas (Line Search)

Use the line search method in auditoriums, cafeterias, and offices with multiple partitions.

1. Spread search team members in a straight line across the open area, _____ metres apart.



2. Slowly walk through the entire open area to the other side.

3. Team members on the ends of the line search perimeter rooms using the go right-stay right method.

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4. The procedure may be repeated in the opposite direction.

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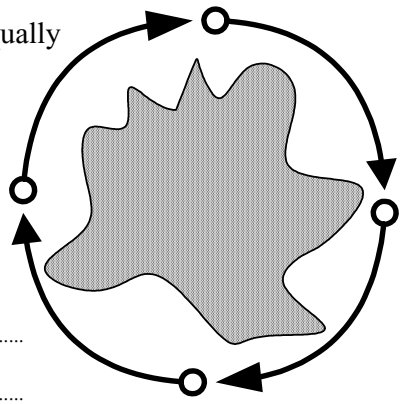
8.3 Perimeter Search

This search pattern can be used when it is not possible or unsafe to search a rubble pile from _____ _____ .

1. Four search team members take positions equally spaced around the search area.

2. After using an appropriate search method, all searchers rotate 90 degrees clockwise. This process can be repeated until all searches complete four rotations (returning to their original positions).



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9. Victim Management

The following concepts and procedures should be applied the moment the search is initiated until the last victim is found.

9.1 Precautions during a search

- Never make inappropriate comments the victim should not hear. Keep your comments on a positive note. Always assume someone is _____ to you.

- The victim is in the worst possible position and fighting to stay alive, and you can enhance their _____ ____ _____by being positive about the possibility of finding and extricating them.

- You may be the first person the victim is able to communicate with; therefore it is important to project a sense of confidence and hope.

9.2 Steps for initial contact with a located victim

1. Identify and overcome language barriers.

2. Identify yourself as a rescuer, projecting confidence and calm in your voice and choice of words.

3. Obtain the following information:
   - _____
   - _____ or _____ (approximate age)
   - Type of _____ and _____
   - _____ status
   - _____
   - Degree of _____

4. Provide emergency medical treatment as quickly as possible.
5. Ask about other potential _____ and their condition.
6. Inform the victim of rescue operations.
7. Inform the victim if you have to leave for short periods.
8. Provide protection from the environment as much as possible.
9. Consider direct or indirect intervention of a _____ or _____, etc.

10. Improvised Search Equipment

10.1 Acoustic detection (use to amplify sound through a crack or opening in a building)

- Stethoscope
- Recorder with microphone mounted on a pole

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10.2 Visual detection

- Telescopic mirror with illumination
- Common video camera

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10.3 Sound transmission

- Loudspeaker mounted on an extension, with microphone
- Portable radios

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10.4 Other

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Collapsed Structure Search Data Form

Date:	**CSSR Team Identification:**
Time:	**Name or description of structure:**
Date of collapse:	**Approximate occupancy at time of collapse:**
Time of collapse:	**Location of structure:**

Occupancy type at time of collapse

☐ Residential ☐ Commercial ☐ Industrial

☐ Other / describe:

_____

Structural Type:

☐ Light Frame ☐ Pre-Fab/Tilt-Up Concrete

☐ Heavy Wall ☐ Heavy Floor

Floors _____ # Columns _____ Blueprint or photo available?_____

Structural Engineer Assessment

Name: _____

Identification:
_____

Condition of Structure:
_____

_____
_

_____
_

Cut off services: ☐ Water ☐ Electricity ☐ Gas

Rescue Information (see rescue victim identification form)

Rescued _____ # Bodies recovered _____

PREVIOUS RESCUE TEAM EFFORTS

Team Name / Id	Leader's Name	Contact Information

Relatives, Neighbours, Witnesses, Residents or Building Personnel with Possible Information on Trapped Victims

Full Name	Association to Structure	Location	Information

Victim Identification Form

Rescued Victims

FULL NAME OF VICTIM OR OTHER IDENTIFYING INFORMATION	DATE	TIME	PLACE	RESCUER'S IDENTITY

Recovered Bodies

FULL NAME OF VICTIM OR OTHER IDENTIFYING INFORMATION	DATE	TIME	PLACE	RESCUER'S IDENTITY

Structure Information Form

(ATTACH THIS FORM TO THE SITE SKETCH FORM.)

POTENTIAL DANGERS PRESENT

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CONFIRMED DANGERS

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PERSONNEL AVAILABLE FOR SEARCHING

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EQUIPMENT AVAILABLE

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Collapsed Structure Search and Rescue Course

Lesson Evaluation for Participants

Do not write your name on this form. Please complete a copy of this form at the end of every lesson.

Your evaluations are very valuable toward improving the course. For ratings, please use a scale system from 1 to 7, as follows:

1 Very poor	2 Poor	3 Below Average	4 Average	5 Good	6 Very Good	7 Excellent

Course Location: _____ **Date:** _____

Please fill in the required information.	**Lesson Number**	**Lesson Name**
	Instructor's Name	
Use a scale from 1 to 7 as described above to rate the various lesson components.	**Lesson Rating** (rate 1 to 7) Content _____ Instructor _____ Method _____ Workbook _____ Interaction _____	
Mark your selection with an "X"	**Instruction Level** (mark with an "X") Appropriate _____ Too basic _____ Too advanced _____	
	Duration (mark with an "X") Appropriate _____ Too short _____ Too long _____	
	Usefulness Was this lesson useful to you? Yes _____ No _____	
Rate from 1 to 7	**Overall Lesson Rating** Taking all the above into consideration, I rate this lesson: _____	
If you need additional space, please use the back of the sheet.	**Comments and Observations**	

Thank you for your help. Your input is valuable. Please turn in this completed form to the instructor.